SOIL SURVEY OF THE HICKORY AREA, NORTH CAROLINA.

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LOCATION AND BOUNDARIES OF THE AREA.

The Hickory area is located mostly in the Piedmont section of western North Carolina. A part of the Brushy Mountains is included in the northwestern corner of the area. The area is rectangular, containing about 988 square miles, or 632,128 acres. It includes parts of Catawba, Lincoln, Burke, Caldwell, Alexander, and Iredell counties. It is bounded on the north by parallel 36° and on the south by parallel 35° 30′ north latitude, and on the east by meridian 81° and on the west by meridian 81° 30′ west longitude. Within the area there is a range in elevation of 1,730 feet.

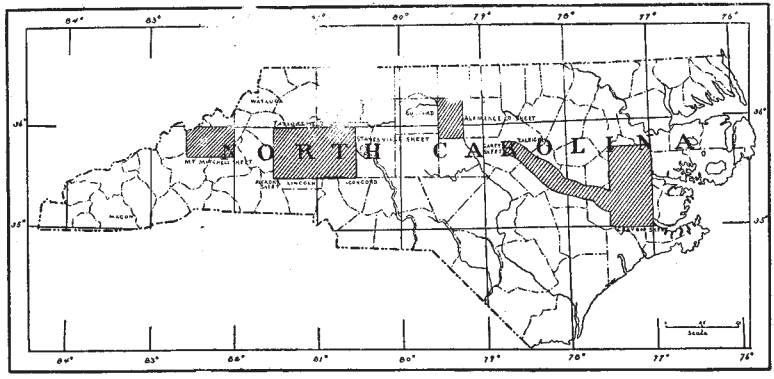

Fig. 5.—Sketch map showing areas surveyed in North Carolina.

Hickory, population 2,535, is the largest town in the area. Newton, county seat of Catawba, is next in size, having a population of more than 1,500. Maiden and Catawba are small but important villages. All these towns are situated on the Western North Carolina Railroad. In the southern part of the area the largest town is Taylorsville, with a population of 413. This place is upon the Charlotte and Taylorsville Railroad.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

Early in the eighteenth century a number of Scotch, who had formerly settled in the north of Ireland, emigrated into New Jersey and

Pennsylvania, and later, coming through Maryland and Virginia, settled in North Carolina. A few came direct from Scotland, but the majority, coming from Ireland, were known as Scotch-Irish. Along with these Scotch-Irish, and settling in the same territory, came the Germans, who also moved south from Pennsylvania and were known as Pennsylvania Dutch. These two nationalities established colonies in Catawba and Lincoln counties, where rich lands could be secured cheaply and without difficulty. The country south of the great bend of the Catawba River was first settled.

The settlers found the country inhabited by the Catawba Indians, with whom they made a treaty of peace. These Indians lived chiefly on the game which abounded in the forests, tilling only small patches of ground. The timber had been removed from these fields by burning, and the planting and cultivating of the crops were done by the squaws.

As the news of the cheap lands, fertile soils, and mild climate was taken back to Pennsylvania, other settlers followed and the region north of the Catawba River was gradually taken up, in spite of the hostility of the Cherokees. In a few years the country south of the Catawba was transformed into a populous community. The bottom lands along the river were the first to be taken up. They were covered by a dense growth of cane, but by burning and draining were more easily cleared and planted than the uplands, covered by forests of oak and hickory. Later, as the population increased, these forests were cleared off. The Dutch settlers wisely chose the stiff red clay lands rather than the sandy soils. These red clay farms are still considered the most valuable farms in the area and in many cases they have not changed hands, but are still owned by the descendants of the original settlers. The red clay soils were soon found to be especially adapted to grain. Their value increased with the increase of population, and as the introduction of more and better agricultural implements increased their production. In the beginning of the nineteenth century the discovery of rich ore beds, the erection of furnaces, and the extraction of iron caused settlement to progress rapidly, and with the increase of the population more lands were brought under cultivation to supply the increasing demands for farm produce.

The character of the first settlers is in no small degree responsible for the great success they have made in agriculture. They were a brave, industrious, law-abiding people. They bought very little and sold much of their farm products. They contracted no debts they were not able to meet. None of them were large slave owners, none were very poor, and none very rich; all were on an equality. These people have changed comparatively little in recent years. The descendants of the Scotch-Irish and Pennsylvania Dutch still own the greater part of the land in the area. Their farms are free from mort-

gages, and they are satisfied to remain at home instead of abandoning the farms to work in the many factories that have been built along the Catawba River in recent years.

In 1870 cotton was introduced into this section of the State and soon became one of the money crops. A few years later tobacco was introduced and large areas of the sandy soil were cultivated to that crop, but at present very little is grown. The larger part of the area is still devoted to corn and wheat, and cotton is also one of the principal crops. The construction of railroads through the area has greatly aided its agricultural advancement, being an especially important factor in building up the fruit industry of the mountains. Thus the Hickory area includes some of the best farms in the State.

PHYSIOGRAPHY AND GEOLOGY.

The area lies almost wholly within the Piedmont Plateau, but is crossed by the Brushy Mountains in the northwest corner. It extends to the range of sharp knobs and ridges that runs from Kings Mountain to Anderson Mountain. The altitude ranges from about 700 feet, where the Catawba River leaves the area, to 2,430 feet at Coxs Knob, in the Brushy Mountains.

The Brushy Mountains form the drainage divide between the Yadkin and Catawba river systems. The streams on the north side flow into the Yadkin, while those south of the mountains empty into the Catawba; but all the water finally reaches the Atlantic. Many of these mountains can be cultivated to the top, but on many others the steeper sides are merely great expanses of bare rock. Where the timber has been cut off the erosion is very rapid, a great part of the soil being washed down into the streams. In the mountain area there are many small, rapid-flowing streams. In the valleys these streams seem to have been cutting their channels deeper in recent years, so that they now furnish a natural drainage for some of the lower lands where water from the surrounding mountains formerly collected and made them too wet for cultivation. The rocks from which these mountain soils are formed consist of granite, gneiss, and schists. They lie very near the surface, often outcropping in masses or in various degrees of disintegration.

The Catawba River flows through the center of the area from west to east. It is a rapid stream, having a considerable fall within the area. This river, together with the Little Catawba, drains the whole of the area south of the Brushy Mountains and furnishes some of the best water power in the State.

The Piedmont Plateau south of the Brushy Mountains presents a gently rolling appearance, with a few isolated peaks along the southeastern and western borders of these mountains. It is intersected by numerous small streams which flow through valleys of level bottom

lands. These bottoms are often narrow and are frequently flooded by the overflow of the streams, whose channels seem to be gradually filling up with material washed down from the hills.

The soils of the plateau are usually deep, and the parent rock is seen only in road cuts or stream beds. These rocks are mainly mica schists, granites, and gneisses, belonging to the Laurentian system. The schists are found on the ridges and higher swells and do not reach down to the level of the river channels, so they overlie the gneisses. These rocks extend across Alexander and Caldwell counties to the Brushy Mountains, becoming coarser grained to the westward. In some places the coarse nodules of quartz and feldspar have the appearance of a conglomerate. East of Newton the rocks appear less micaceous, and syenite and other hornblendic rocks are more abundant. Westward, toward Hickory, mica schists are found which weather into a soft brown material. They can be easily cut, being in many respects like soapstone. Garnet crystals occur abundantly in many of the rocks, but are so imperfect and altered by weathering that they have no commercial value.

The southeastern part of the area lies within what is known as the Kings Mountain belt. This is a narrow belt, composed of quartzites, clay slates, and mica schists, which extends from Kings Mountains northeast to the Catawba River. These rocks are thought to belong to the Huronian system. Beds of limestone occur frequently in this belt, the largest deposit being a few miles north of Anderson Mountain. Many varieties of minerals occur in this section, but the only one of commercial value is iron. There are a number of beds of magnetic iron ore in the vicinity of Anderson Mountain. The thickness of these beds is from 4 to 12 feet, and the ore is very rich in iron. Brown hematite ore is also found here in large quantities. Until recently these deposits were worked. The furnaces were built near the mines and flux was obtained from the limestone deposits near by. The abandonment of these mines was not due to the lack of ore or to a poor grade of ore, but to the distance from the railroads, the difficulty of getting the product to a market, and to the lack of capital. The mining done here has always been on a small scale. It has been carried on at intervals for a period of a hundred years or more.

Gold has been found in small quantities in several parts of the area, but not in sufficient quantity to be mined profitably. The Shuford mine, near Catawba Station, has been worked at different times for many years, gold being found in both the soil above the rock and in the rock itself. Only one gold mine is now in operation in the area. This lies about 4 miles east of Newton. In this mine small amounts of gold are obtained from the underlying rock. Mica and monazite have both been mined in the area, but not extensively. The mona-

zite is found in the stream beds, and is obtained by shoveling and washing the gravel deposits.

The stiff pipe clay found on the Little Catawba River is extensively used in the making of earthenware vessels, and this industry has grown up rapidly in the southern part of the area.

SOILS.

In all ten different types of soil were recognized in the Hickory area. The following table shows the extent of each of these types and the proportion which each is of the whole area surveyed:

Areas of different soils.

Soil.	Taylorsville sheet.	Hickory sheet.	Total area.	Proportional extent.
	Acres.	*Acres.*	*Acres.*	*Per cent.*
Cecil sandy loam	149,120	206,848	355,968	56.4
Cecil clay	33,920	86,784	120,704	19.1
Porters sandy loam	49,792	128	49,920	7.8
Conowingo clay	29,952	.....	29,952	4.6
Porters stony loam	22,528	2,624	25,152	4.0
Meadow	9,536	14,336	23,872	3.8
Porters sand	11,136	.....	11,136	1.8
Porters clay	7,552	.....	7,552	1.2
Durham sandy loam	1,344	6,016	7,360	1.2
Porters black loam	448	64	512	.1
Total	315,328	316,800	632,128	100.0

CECIL CLAY.

The Cecil clay is a red clay loam of sticky, tenacious character, and is usually a heavy soil to work. The depth of the soil varies from 6 to 9 inches. The subsoil is a purer red clay of more sticky and tenacious character than the soil. The depth of the subsoil is usually several feet. Throughout both soil and subsoil there are often numerous fragments of quartz, and sometimes fragments and bowlders of basalt.

Sometimes this type is a very heavy, tenacious red clay from the top down, and sometimes the underlying rock is found only a few feet below the surface.

The Cecil clay, which is confined to the Piedmont Plateau, is chiefly found in one continuous belt extending in a northeast-southwest direction from the vicinity of Reepsville, past Newton, across the Catawba River near the great bend, to Scotts Cross Roads, and on into Iredell County. Usually where large areas of this soil occur there is a great uniformity in surface features. Throughout the Piedmont Plateau there are small, isolated patches of Cecil clay, but often, owing to the

location, these red-clay patches have been formed by the sand washing off of what would naturally be Cecil sandy loam and exposing the subsoil of the latter. When properly cared for such patches can be made as productive as the typical Cecil clay.

This type of soil has been formed from the slow weathering of granite, gneiss, and schist, and is a residual soil. The quartz scattered on the surface is derived from dikes that have not weathered as readily as the surrounding rocks.

This soil is recognized as one of the most fertile in the area, and where it is found the general appearance of the farms is better than on the other types. The soil is readily improved, retains added fertility well, and is generally recognized as being capable of a high state of cultivation. It is well adapted to nearly all general farm crops, but is especially well adapted to wheat, which returns yields as high as 40 bushels to the acre. The average yield, however, is less than 20 bushels. Next in importance to wheat are cotton and corn. With the best of treatment the soil will produce 1 bale of cotton to the acre, but the average is about one-half bale. The average yield per acre of corn is about 30 bushels. Cowpeas are grown extensively, both for forage and as green fertilizer. Very little clover is grown, but from the appearance of the few fields seen it is evident that this soil is very well adapted to this crop.

The following table gives mechanical analyses of soil and subsoil of the Cecil clay:

Mechanical analyses of Cecil clay.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7318	1 mile S. of Sloan...	Red clay loam, 0 to 7 inches.	1.68	4.16	9.68	8.34	20.64	10.96	22.66	22.96
7320	2 miles N. of Conover.	Red clay loam or clay, 0 to 6 inches.	1.36	4.56	9.48	6.18	14.92	8.10	25.74	30.26
7322	Louise.....	Clay loam, 0 to 7 inches.	2.15	8.90	13.40	7.32	15.08	9.04	23.76	21.84
7323	Subsoil of 7322.....	Sticky red clay, 7 to 36 inches.	.50	5.00	9.30	4.88	11.22	6.28	20.68	42.02
7319	Subsoil of 7318.....	Stiff red clay, 7 to 36 inches.	.69	2.90	7.42	9.14	18.70	8.62	26.96	26.08
7321	Subsoil of 7320.....	Sticky red clay, 6 to 36 inches.	.19	2.40	5.12	3.64	8.70	5.72	23.32	50.04

CECIL SANDY LOAM.

The Cecil sandy loam is a gray or grayish-yellow sandy loam, varying in depth from 8 to 15 inches, underlain by a subsoil of red clay,

usually of a stiff, tenacious character and having a depth of several feet. Throughout both soil and subsoil there are often numerous fragments of quartz. This type is one of the most widely distributed of any in the Piedmont section of the area.

While in general the Cecil sandy loam has a red clay subsoil, occasionally the subsoil is reddish-yellow or yellow. Throughout the area there are on the hillsides places where sand has been washed away, leaving the subsoil exposed. These places, locally called "gall spots," have the general appearance of Cecil clay. Such spots, where larger than 10 acres, have been included with that type. Smaller areas have been classed with the Cecil sandy loam.

The surface features of the Cecil sandy loam areas include all of the general features of the Piedmont Plateau, varying from broad, uniform uplands to areas dissected by numerous streams. The soil is always well drained.

Like the Cecil clay, this soil is a residual soil formed by the slow weathering of granite, gneiss, and schist; but there is this difference, the rocks from which the Cecil sandy loam is derived have a greater proportion of quartz in their composition, and hence the greater abundance of sand in the soil.

The principal crops grown are cotton, corn, wheat, oats, cowpeas, and sweet potatoes and other vegetables. Cotton is the principal crop, and the average yield per acre is one-half bale, although the best farmers often secure as much as 1 bale to the acre. When the ground is well cared for and fertilized the average yield per acre of corn is 25 to 35 bushels, and that of wheat, under the same conditions, about 12 bushels. The possibilities of this soil for sweet potatoes are shown in the vicinity of Hickory, where several farmers are specializing that crop. In 1901 110 carloads were shipped from that place to Northern and Eastern markets. The average yield is about 200 bushels per acre. Mr. J. Ingold raised as high as 345 bushels per acre last year. This soil is fairly well adapted to all general farm crops, and when not too near the mountains seems especially well adapted to cotton, sweet potatoes, and vegetables. The soil requires careful treatment to bring out its possibilities.

The following table contains mechanical analyses of the soil and subsoil of the Cecil sandy loam:

Mechanical analyses of Cecil sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7324	6 miles N. of Conover.	Grayish-yellow sandy loam, 0 to 15 inches.	0.76	7.00	11.42	9.16	27.02	17.66	18.48	8.72
7326	2½ miles E. of Hickory.	Gray sandy loam, 0 to 10 inches.	1.68	8.16	17.48	9.76	19.94	11.16	22.26	10.90
7328	Taylorsville.....	Grayish-yellow sandy loam, 0 to 10 inches.	.82	10.06	17.12	11.88	23.04	9.86	15.16	12.56
7327	Subsoil of 7326.....	Yellowish-red clay loam, 10 to 36 inches.	.68	7.44	14.38	8.30	15.26	7.54	16.40	30.68
7329	Subsoil of 7328.....	Red clay loam, 10 to 36 inches.	.80	4.74	6.26	5.30	16.34	10.36	17.04	39.96
7325	Subsoil of 7324.....	Red clay loam or clay, 15 to 36 inches.	.41	2.74	6.60	5.00	17.18	10.66	13.82	43.64

DURHAM SANDY LOAM.

The surface soil of the Durham sandy loam is of a light-gray color and has a depth varying from 8 to 20 inches. The subsoil is a yellow clay loam, usually several feet in depth. Quartz fragments of various sizes are often strewn upon the surface. This is a Piedmont Plateau soil, and in the Hickory area was found only in the vicinity of Rocky Springs, Edith, and Reepsville. It seems to be confined to the broad, level uplands, but is well drained, owing to the porosity of both soil and subsoil. It is a residual soil derived from the weathering of gneiss, schist, and a variety of pegmatite granite.

Of the soils in the Piedmont Plateau this is one of the poorest. Nearly all of the general farm crops, such as cotton, corn, oats, and sweet potatoes, are grown on it, but the yields are not high, even where the methods are best. The average yield per acre of cotton is hardly one-half bale, that of corn about 15 bushels, and of oats about 15 bushels. The soil seems well adapted to sweet potatoes, the average yield being 200 bushels per acre. It is equally well adapted to tobacco, but none is now grown, owing to competition with more eastern sections of the State. It is well adapted to truck farming. It is not usually used for wheat, but when it is the yield is about 8 bushels per acre. Apples and peaches seem to do fairly well. The original fertility and added manures leach from this soil very rapidly, and it needs

the constant addition of plant foods and careful handling to prevent its rapid deterioration. This type is known locally as "piny woods land."

The following table gives mechanical analyses of the Durham sandy loam:

Mechanical analyses of Durham sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7332	2 miles E. of Carson.	Grayish-yellow sandy loam, 0 to 8 inches.	1.76	15.42	25.54	13.72	19.58	8.54	11.00	5.70
7334	Rocky Springs.....	Sandy loam, 0 to 12 inches.	.94	12.54	24.68	12.38	19.00	8.06	16.62	6.46
7330	1½ miles NW. of Bandy.	Yellowish-gray sandy loam, 0 to 8 inches.	1.47	11.52	15.46	11.14	20.20	11.04	21.92	8.14
7335	Subsoil of 7334.....	Yellow clay loam, 12 to 36 inches.	.26	11.24	19.92	9.68	14.84	6.16	17.30	20.64
7333	Subsoil of 7332.....	Yellow loam, 8 to 30 inches.	.35	11.88	17.52	10.22	14.88	6.40	8.46	30.48
7331	Subsoil of 7330.....	Yellow loam, 8 to 36 inches.	.92	4.44	6.02	4.60	9.42	5.36	17.78	52.24

PORTERS SANDY LOAM.

The Porters sandy loam consists of a grayish-yellow or red sandy loam or loam with an average depth of 7 inches underlain by a subsoil of sticky, tenacious red clay often with a depth of several feet. In both soil and subsoil, and often on the surface, are fragments of quartz and other rocks.

This soil bears the same relation to Porters clay as the Cecil sandy loam does to the Cecil clay, and is distinguished from Porters sand by the fact that it has a stiff, tenacious red clay subsoil.

It is found on the mountain tops, mountain slopes, in the valleys between the mountains, and on the high, rolling lands between the mountains and the Piedmont Plateau.

This soil is a residual soil formed from the slow weathering of the same kinds of rocks as Cecil sandy loam.

In the mountain valleys and on high, rolling lands it is regarded as a good soil for general farm purposes. The seasons here are too short for the profitable growing of cotton. Wheat, corn, oats, rye, sweet and Irish potatoes, and fruits are the principal crops.

The following table contains mechanical analyses of the soil and subsoil of the Porters sandy loam:

Mechanical analyses of Porters sandy loam.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7340	Hibriten.....	Grayish sandy loam, 0 to 9 inches.	2.29	5.20	17.50	14.78	27.74	10.26	14.44	9.86
7342	3 miles N. of Partee.	Sandy loam, 0 to 8 inches.	1.02	5.86	8.94	8.08	32.42	15.04	15.24	14.42
7356	Barretts Mountain..	Sandy loam, 0 to 8 inches.	1.58	6.92	12.98	9.20	21.90	14.04	19.48	15.40
7357	Subsoil of 7356.....	Stiff red clay, 8 to 36 inches.	.47	2.76	6.74	5.24	16.94	9.00	21.50	37.86
7341	Subsoil of 7340.....	Stiff red clay, 9 to 36 inches.	.48	4.06	11.38	7.94	14.56	5.80	13.94	42.32
7343	Subsoil of 7342.....	Stiff red clay, 8 to 36 inches.	.35	3.30	6.32	5.50	18.08	7.10	14.96	44.28

PORTERS CLAY.

The Porters clay is in its general characteristics and process of formation essentially the same as the Cecil clay. It is a tenacious red clay with an average depth of 6 inches, underlain by a stiff, tenacious red clay to a depth of 36 inches or more.

Occasionally it was found that where this type grades into the Porters sandy loam it becomes loamy itself; and sometimes it was found that the subsoil ran into disintegrated rock only a few feet below the surface. There is usually a considerable quantity of quartz and other rocks strewn upon the surface, and sometimes the proportion of rock in both soil and subsoil is very great.

Whatever difference there is between this soil and the Cecil clay in adaptation to crops and in crop yields is due largely to its position. The type is confined to the mountain areas, but there it is found in all locations, from the intervening valleys to the mountain tops. A good example of its occurrence in mountain valleys is found to the east and northeast of Lenoir. In those valleys, it is said, the soil is not quite as good as the red clay of the Piedmont area, because it becomes "as hard as a brick" in dry times. But with deeper plowing the condition can be greatly alleviated.

The Porters clay is a residual soil formed, as is Cecil clay, from the slow weathering of granite, gneiss, and schist. Owing to its position in the mountains it is a well-drained soil. It is adapted to all of the

general farm crops of the area except cotton, and it is not adapted to the latter because the growing season is too short for proper maturity of the bolls. The average yield of wheat per acre is about 15 bushels and that of corn about 18 bushels. Oats do very well, but are not usually thrashed, being fed to stock in the sheaf. With fertilizer and proper preparation of the ground wheat sometimes yields as high as 25 bushels per acre, and corn, with the same care and attention, does proportionately as well. Excepting the bottom lands, it is recognized as the strongest land of the mountain area. It is best adapted to wheat and apples, and is a good pasture land.

The following table gives mechanical analyses of the soil and subsoil of Porters clay:

Mechanical analyses of Porters clay.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7362	Vashti	Red clay loam, 0 to 6 inches.	2.24	4.14	12.30	9.16	19.44	10.02	18.52	25.72
7360	Kings Creek	Clay or clay loam, 0 to 7 inches.	.91	3.54	9.30	8.40	24.38	14.86	12.40	26.12
7358	1 mile SW. of Hibriten.	Brownish-red clay loam, 0 to 6 inches.	1.11	3.00	13.50	9.84	21.00	10.14	13.94	28.32
7363	Subsoil of 7362	Stiff red clay, 6 to 36 inches.	.47	5.10	11.94	8.54	16.10	7.80	11.28	39.20
7361	Subsoil of 7360	Stiff red clay, 7 to 36 inches.	.28	1.74	5.44	4.50	13.20	12.20	18.40	45.46
7359	Subsoil of 7358	Stiff red clay, 6 to 36 inches.	.36	2.94	7.88	4.64	9.32	6.76	19.22	49.00

CONOWINGO CLAY.

The surface soil of the Conowingo clay is a grayish-yellow gravelly loam about 8 inches in depth. The surface is strewn with small pieces of magnetite iron and fragments of talc schist, the latter sometimes in large quantities. The subsoil is a reddish clay loam, running into solid rock at from 2 to 5 feet below the surface. The underlying rock is talc schist and is locally known as "red soapstone." This rock is scattered throughout both soil and subsoil. This type is found in the Little Brushy Mountains, and extends in an irregular belt, often 4 or 5 miles wide, from the vicinity of Valdese northeast to Taylorsville. Owing to its position this type is well drained, but unless very well cared for it is a poor soil. Owing to the erosive power of the gravel when carried along by the surface water the soil washes badly.

The areas where this type is found were until recently covered with forests, but the large timber has been cut off.

The Conowingo clay is a residual soil, derived from the weathering of talc schist.

All of the general farm crops of the country are grown upon this soil. Its position near the mountains, however, makes the season too short for profitable cotton growing. Corn yields from 12 to 15 bushels per acre, wheat from 5 to 15, and oats average about 15 bushels per acre. Deep plowing greatly improves the land. Fragments of the talc schist brought to the surface seem upon weathering to have some value as a fertilizer. When deep plowing is practiced this soil seems fairly well adapted to wheat, yields as high as 18 bushels per acre sometimes being secured. The possibilities of this soil for grapes is demonstrated by what has been done by the colonists at Valdese, near Morganton.

The following table gives mechanical analyses of the soil type:

Mechanical analyses of Conowingo clay.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7344	1½ miles S. of Cedar Valley.	Grayish-yellow gravelly loam, 0 to 8 inches.	1.88	7.60	14.14	8.84	19.88	13.74	24.18	11.48
7348	Taylorsville.....	Grayish-brown gravelly loam, 0 to 8 inches.	1.09	15.50	17.16	9.80	16.98	9.22	17.84	12.90
7346	1 mile NE. of Hudson.	Grayish-yellow gravelly loam, 0 to 6 inches.	2.86	6.42	16.80	10.34	22.52	12.54	16.38	14.88
7349	Subsoil of 7348.....	Reddish-yellow loam, or gravelly loam, 8 to 36 inches.	.72	14.34	16.46	7.82	12.36	5.84	11.34	31.52
7347	Subsoil of 7346.....	Reddish-yellow gravelly loam, 6 to 24 inches.	1.70	8.98	16.94	9.50	14.92	7.02	8.44	34.42

PORTERS BLACK LOAM.

The Porters black loam is a loose, black loam varying in depth from 6 to 20 inches and having a red clay subsoil, often several feet deep. Throughout the soil there is a large proportion of organic matter, and throughout both soil and subsoil, and also on the surface, are found many rock fragments of all sizes.

Where conditions are favorable this soil often attains a depth of 2

feet, but usually it is much shallower. Often the subsoil runs into disintegrated rock a few feet below the surface, and sometimes the subsoil, instead of being a clay, is a coarse sandy loam. This type is confined to the mountainous part of the area, and is found either on the tops of the mountains or in the coves on the mountain slopes. From its position it is naturally well drained.

The chief characteristics of this type are its loose texture and black color. It is apt to occur anywhere where the decomposition of organic matter is slower than the accumulation. The organic matter is usually intimately mixed with the soil, the mineral particles having been supplied partly by weathering of the underlying rock and partly by wash from the surrounding steep mountain slopes.

All crops which are grown in the mountains do well upon this soil, but it will not stand extensive cultivation on account of its tendency to wash when stirred up. It is becoming generally recognized as the very best soil of the country for apples. With proper attention apples do well on almost any of the mountain soils, but upon the Porters black loam they seem to thrive without any particular attention. Both the early and late varieties of apples are grown to perfection. Among the early varieties the most popular are Greensboro Striped June, Greensboro Red June, and Yellow Transparent. Of later varieties the Red Limbertwig and Johnsons Seedling are most in favor.

The following table gives the mechanical analyses of soil and subsoil of Porters black loam:

Mechanical analyses of Porters black loam.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7350	1½ miles W. of Draco.	Loam, 0 to 12 inches.	4.19	4.00	9.04	8.38	26.20	18.32	20.10	13.50
7354	Lick Mountain.....	Loose black loam, 0 to 15 inches.	4.27	8.50	13.44	9.50	25.84	10.50	17.74	13.82
7352	½ mile SE. of Hibriten.	Loose black loam, 0 to 18 inches.	4.23	7.68	14.28	10.70	23.98	11.48	15.62	16.26
7355	Subsoil of 7354.....	Yellowish sandy loam, 15 to 36 inches.	.99	7.74	13.20	10.08	27.16	11.30	17.20	13.02
7353	Subsoil of 7352.....	Yellowish sandy loam, 18 to 36 inches.	.57	7.24	13.86	9.90	26.76	11.00	17.76	13.44
7351	Subsoil of 7350.....	Red clay loam, 12 to 36 inches.	1.84	3.74	9.10	7.94	20.98	12.28	15.92	30.26

PORTERS SAND.

The Porters sand is a grayish-yellow coarse sand, with an average depth of about 12 inches, underlain by a subsoil of coarse yellow sand or sandy loam, running into rock in various stages of disintegration a few feet below the surface. Considerable quantities of rock fragments are strewn upon the surface and mingled throughout both soil and subsoil.

This soil is confined to the mountainous area, and may be found at all elevations, from the top of the mountains down to the steep slopes of the lower ridges extending out into the plateau from their base. Larger areas of this soil occur on the south side of the Brushy Mountains than on the north side.

The parts of the area where this soil is found are usually thinly settled, and large areas of it are still covered with good timber. When cleared and cultivated this soil washes so badly that it is regarded as a poor soil for farming purposes. Where the elevation is right and the inclination not too steep peaches do well.

The following table gives mechanical analyses of soil and subsoil of Porters sand:

Mechanical analyses of Porters sand.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7366	2 miles N. of Emanuel.	Grayish-yellow sandy loam, 0 to 12 inches.	0.77	12.50	17.04	11.30	24.44	16.66	12.78	4.88
7368	1 mile SW. of Vashti.	Yellowish sandy loam, 0 to 10 inches.	.35	9.84	19.84	11.64	26.94	12.34	12.36	7.20
7364	1 mile N. of Draco..	Grayish-yellow sandy loam, 0 to 12 inches.	1.82	13.52	22.80	12.18	17.76	8.02	11.62	13.82
7367	Subsoil of 7366.....	Yellowish loam or sandy loam, 12 to 36 inches.	.16	10.52	17.58	11.84	25.74	16.76	13.50	4.10
7369	Subsoil of 7368.....	Coarse yellowish sandy loam, 10 to 36 inches.	.27	12.74	22.20	13.24	24.80	10.36	7.56	8.92
7365	Subsoil of 7364.....	Coarse yellow sandy loam, 12 to 36 inches.	.23	15.70	19.70	11.44	18.92	7.82	13.84	12.02

MEADOW.

In the present area the Meadow includes all low-lying bottom lands subject to flooding. It is a soil formed by the deposit left from the

overflow of streams. Its materials are heterogeneous and of varied origin. Sometimes they may be derived from the local wash from near-by hills, and again they may have come from the mountains hundreds of miles away. A description which would apply to some particular locality might not apply to any other locality. Some of these bottom lands were among the first to be cleared and cultivated when the country was settled, and to-day some of them are among the most valuable lands of the area. In their original condition they were covered with cane, alder, and larger trees, and were quite swampy. When they were cleared and drained this swampy condition disappeared. Since the introduction of cotton into the area a great deal of the loose soil from the hills has been carried down into the streams. This, together with the cutting off of so much timber, both within the area and in the mountains to the north and west, has made freshets more frequent and as a result the bottoms have been filling up. In many cases the channels have been so filled as to make gravity drainage impossible because of the lack of fall. Some of the meadow land has become swampy, and more has been covered over with a coating of barren white sand. Where the meadow has not been thus ruined it is still the best land of the area for corn and grass.

PORTERS STONY LOAM.

The Porters stony loam is a grayish-yellow sandy loam, with an average depth of about 8 inches, beneath which occurs a subsoil of yellowish or sometimes reddish loam. Mingled with both soil and subsoil and scattered on the surface are great quantities of rock fragments.

This soil is a mountain type, and in reality represents a condition rather than a group of definite textural characteristics. Under this term was included all land too rocky and steep to cultivate. Occasionally, however, there were small areas in the midst of larger areas of this soil that could be used for agricultural purposes. The rocks on such areas are occasionally collected and built into fences or thrown into ravines. The mountainous position of this type makes it desirable for apples, peaches, and grapes wherever it is sufficiently free from rocks or where it is practicable to remove them by hand. One of the successful apple growers in the Little Brushy Mountains has gathered the stones and either made fences of them or built stone walls across mountain ravines at equal intervals, placing above each wall an apple tree. (See Pl. VIII.) The accumulation of fine material and the retention of moisture about the roots of the tree, resulting from this method, are said to be very favorable to its growth. On Barrett Mountain some of the best peach orchards of the area are growing upon Porters stony loam. The success of these orchards depends, probably, as much upon location as upon the nature of the soil, as the areas in orchard lie above what is known as "the frost line." These areas are used exclu-

sively for fruits, being too steep and stony for cultivated crops or grains. Many of the areas have very valuable hard-wood timber growing upon them.

The following table contains mechanical analyses of soil and subsoil of the Porters stony loam:

Mechanical analyses of Porters stony loam.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7336	Barretts Mountain .	Grayish-yellow stony loam, 0 to 7 inches.	3.10	7.10	14.56	9.90	21.12	9.32	28.24	9.28
7338	Downsville	Grayish-yellow sandy loam, 0 to 10 inches.	1.57	3.16	10.34	9.12	35.94	11.26	19.04	10.80
7339	Subsoil of 7338.....	Yellowish loam, 10 to 36 inches.	.84	3.02	8.30	7.00	31.74	16.48	20.38	12.94
7337	Subsoil of 7336.....	Yellow loam or clay loam, 7 to 30 inches.	1.46	4.12	11.42	9.30	18.88	8.50	24.78	22.52

SOIL PROBLEMS.

There are two chief soil problems before the farmers of the Hickory area. One is particularly limited to the area north of Catawba River, and is the restoration of the fertility and productiveness of many farms in that part of the area. The present plight of these farms is due to the careless and inefficient methods of cultivation, among which may be enumerated the absence of a proper system of rotation of crops, the constant cropping to cotton, corn, or wheat, shallow plowing, improper or imperfect cultivation, inviting gullying, and the leaving of the fields unprotected by vegetation during the winter season, thus accentuating the loss of fertility by leaching and washing.

Much of the area in these farms can be rejuvenated by a reversal of these methods, by adding to the crop rotation one or more of the legumes, and by increasing the number of live stock carried on the farms and husbanding the manure made by these animals in consuming the forage afforded by the legumes, the corn fodder, and the native grasses.

Deeper plowing, gradually letting the share cut deeper year by year, and thus bringing only a little of the subsoil to the surface in any one year, will be found of great value both in renewing the fertility of the worn-out fields and in decreasing the tendency of the soils to wash. The increasing of the porosity of the soil by incorporating

with it the stubble of clover and cowpeas and coarse stable manure also helps to prevent washing, while at the same time adding needed organic matter.

The other problem is the reclamation of the bottom lands, many of which have become in recent years too wet for cultivation, or, even where cultivable, subject to more frequent overflow than formerly. This change has resulted from the silting up of the channels. Some of the bottom land along the Catawba River, the most valuable soil of the area for the production of corn and grass, is to-day almost valueless because of a thick deposit of barren white sand brought down by the flood of the spring of 1901.

The chief factors in the deterioration of the bottoms are the rapid deforestation of immense areas of mountain woodlands and the constant shallow cultivation of the fields in cotton and corn. The removal of surface soil by the heavy rains is, as a result, greatly increased, and the filling up of the stream channels and flooding of the meadow areas follows. The proper tilling of the fields will tend to decrease the amount of silt carried by the streams. The springing up of young forests on the denuded mountains will tend to lessen the frequency of floods, and in time the streams may again deepen their channels so that drainage of the bottom lands will be reestablished and their cultivation reentered upon. Those areas covered with deposits of pure sand are probably permanently ruined as far as agriculture is concerned, unless subsequent floods shall add other material or remove the sand deposits.

AGRICULTURAL CONDITIONS.

The whole area has been an agricultural one since the time of its first settlement. The section about Newton, Hickory, and Lincolnton is very prosperous. The lands have the highest average value of any in the State. This prosperity is due primarily to the abundance of Cecil clay and a good type of Cecil sandy loam, and the favorable climatic conditions, together with the sturdy, industrious class of people who own these lands.

In recent years the railroads have opened up ready markets for farm products. Until very recently these communities were purely agricultural ones, but the abundance of excellent cotton and timber lands and good water power, together with the tendency of industries to move southward, is gradually transforming this section into an industrial community, so that some of the old towns have doubled their population, and new towns have grown up around the cotton mills and furniture and wagon factories. This additional growth has created additional demands for farm produce, so that farming is receiving new stimulus. Formerly considerable tobacco was grown in the area, but when most of the tobacco factories of the State went into

the hands of one company the growers in less favored localities had to abandon this crop, because of a lack of competition in the tobacco market.

The owners of the soil are nearly all descendants of the sturdy German and Scotch-Irish stock who first settled that section of the country, and in many cases the farms have remained in the hands of the same family from the time of settlement. The farms are small, the average size being about 125 acres. The owners do their own work and do not depend upon the inefficient labor of the locality. The lands are free from mortgage and there is an abundance of improved machinery. The houses are substantial, and the barns and sheds, though not pretentious, are sufficiently large to house the crops of such a climate. There is a diversity of crops, so that a failure of one does not mean a failure for the year. There are no very wealthy farmers and no very poor ones, so that all are about on an equality. Not much of the land is for sale, but there are plenty of opportunities for poor men to start a home. The lands can be cleared and planted without the expense of fencing, as the stock law protects the crops. For such a prosperous section the wagon roads are very bad, but the property owners are beginning to realize that good roads enhance the value of their property. Wagon roads are usually built along some of the many ridges traversing the area. The railroads generally follow the same plan. Along the main traveled highway from Taylorsville to Statesville, a distance of 20 miles, the wagon road crosses the railroad twenty-seven times. The same condition exists between Newton and Morganton. Where the railroad traffic is great accidents are common. Such a condition ought not to exist; highways should be kept a safe distance from the railways.

The soils are principally residual soils derived from gneiss and schist by the slow process of weathering. Aside from the heterogeneous bottom lands the important soils are the Cecil clay and Cecil sandy loam. The Cecil clay is recognized as the strongest soil of the section because it is capable of the highest state of improvement. It is a difficult soil to work, but maintains fertility well. It is well adapted to all general farm crops of the section, but is especially adapted to wheat. The Cecil sandy loam is also capable of a high state of cultivation, but improvements in fertility and condition are not as permanent as in the case of the Cecil clay, nor is the soil as well adapted to wheat as the Cecil clay. It is better adapted to sweet and Irish potatoes and to vegetables. In the vicinity of Hickory sweet potato culture has become a very important industry on this soil. Less than a score of years ago this crop was not grown in the area for market. When it was found how successfully it could be grown, Asheville and other near-by markets were supplied, but the supply soon became greater than the demand. The board of trade at

ON PORTERS STONY LOAM, CEDAR VALLEY, HICKORY AREA, NORTH CAROLINA.

ying piles of stones on the lower side of the slopes to hold the soil in place.

Hickory then took the matter up and obtained concessions in freight rates to Northern markets. New York, Boston, Pittsburg, and Cincinnati are among the present markets. Over a hundred carloads were shipped from the vicinity of Hickory in the fall of 1901.

The small areas of Durham sandy loam in the vicinity of Hickory and Newton were formerly used for tobacco. These areas, also, are now successfully cultivated in sweet and Irish potatoes and vegetables, besides being suited to the production of the general farm crops common to the area. The bottom lands have always been used for corn and grass, and where they are not too wet they are still used for those crops.

The Conowingo clay, along the border of the Piedmont Plateau at the foot of the mountains, is generally regarded as a poor soil. When plowed deep, this soil does moderately well for all general farm crops except cotton. Its nearness to the mountains makes the climate too cool for cotton. The possibilities of this soil for grape culture are demonstrated by the large and beautiful vineyards of the colony from northern Italy who founded the town of Valdese, just outside of the area. The Porters sand and Porters stony loam, on the tops of the mountains above what is known as the "frost line," are especially well adapted to peaches. This is attested by the successful peach orchards on Barrett Mountain. With proper attention apples do well upon almost any of the mountain soils. At Cedar Valley Mr. H. P. Anderson is making a great success of the production of apples upon the Porters stony loam—a poor, rocky soil. As mentioned in the description of that soil type, he builds stone walls across the mountain ravines and above each wall sets out a tree. The soil gradually accumulates around the bottom of the tree and the depression has a tendency to retain the soil moisture, making the conditions favorable to rapid and vigorous growth. The greatest success with apples in the mountains, however, seems to be upon the loose, black, loamy soil (Porters black loam) which sometimes accumulates on the mountain tops, but more often in the sheltered coves. This soil is usually rich in organic matter, which is intimately mixed with fine soil washed from higher ground and with rock fragments of all sizes. Its loose texture and cool, sheltered location make it especially adapted to late varieties of apples. The bottom lands in the mountain valleys are also well suited to the production of apples. The possibilities of apple growing on a commercial scale in the Brushy Mountains are demonstrated in the vicinity of Kilby, a few miles north of Taylorsville, and also on Lick Mountain, a few miles north of Hudson. The former orchards are growing in Porters sandy loam and the latter in Porters black loam.

The commercial orchards in Wilkes and Alexander counties are being damaged by two very injurious fruit diseases. An expert

examination of the diseased parts of several trees show that the diseases are an apple rust due to a fungus known as *Glœosporium versicolor*, and the fire blight. These diseases are becoming very destructive and deserve immediate attention, but in a report of this kind it would be impossible to give full details for preventing and curing them. They have been fully considered in other reports which can be obtained by request. The reports on the apple rust are Bulletin No. 44 of the Kentucky experiment station, and Farmers' Bulletin No. 38 of the North Carolina department of agriculture. Fire blight is treated in Bulletin No. 40 of the Colorado experiment station and Farmers' Bulletin No. 153 of the North Carolina department of agriculture. All of these deserve careful study.

Not much attention is given to the fruit industry in the Piedmont section of the area, although enough apples, peaches, pears, and grapes are usually grown to meet the local demand. The Cecil sandy loam is very well adapted to nurseries, and at Startown there are hundreds of acres devoted to this industry. It is only in the mountainous portion of the area, where the climatic conditions are more favorable, that the fruit industry is upon a commercial basis. It has been observed that the successful production of fruit in the area is gradually moving northward, and that many varieties of apples which formerly did well along the border of the Piedmont Plateau can now be grown successfully only in the mountains several miles farther north. This change is thought to be due to the cutting of so much timber and the resulting change in climatic conditions.

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SOIL MAP
NORTH CAROLINA
HICKORY SHEET

N.C. DEPT. OF AGRICULTURE
S.L. PATTERSON, COMMISSIONER
B.W. KILGORE, STATE CHEMIST

SOIL PROFILE
(3 feet deep)

Cecil sandy loam — Ssc / C
Cecil clay — Scc / C
Durham sandy loam — Ssc / Scc
Porters sandy loam — Ssc / C
Porters black loam — Sc / C
Porters stony loam — Sc
Meadow

LEGEND
Ssc Sandy loam
Sc Loam
C Clay
Scc Clay loam

LEGEND
Csl Cecil sandy loam
Cc Cecil clay
Dsl Durham sandy loam
Pl Porters sandy loam
Pbl Porters black loam
Psl Porters stony loam
M Meadow

81°30′ 20′ 10′ 81°
40′
35°30′

Sides Mill · Penelope · Hickory · St. Stephen Ch · Marvin Ch · Rosemont · Etowah Mill · Conover · Fair Cr. Ch · Setzer · Catawba · Pine Mt. · Whiteners Mill · Miller's Mill · Links Mill · Mountain Ch · Zion Ch · Wisnants Store · Baker Mt. · Wilkes Ch · NEWTON · Wilsons Mill · Edith · Bandy · Prospect Ch · Startown · Myers Mill · Mt. Olin Ch · Brittain's Mill · Probsts Store · Jacob Fork · Blackburn · Nebo Ch · Carson · Sherrills Mill · Pisgah Ch · Hoopers Mill · Mull Grove · Linn Mt. · Grace Ch · Louise · Fulbright's Mill · Plateau (Reepersville) · Klines Mill · Drumvile · Ebenezer Ch · Corinth Ch · Hog Hill · Maiden · Cotton Factory · Mountain Creek · Anderson Mt. · Henry · Rudicils Store · Chronicle · Hoyles Mill · Mt. Vernon Ch · Reepville · Killians Mill · Sanders Mill · Denver · Macedonia Ch · Hull X Roads · Cedar Ch · Mullins Store · Hokes Mill · Derr · Kidville · Castners Mill

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Soils Surveyed by
Thos. A. Caine
1902

BASE MAP ENLARGED AND REDRAWN FROM
U.S. GEOLOGICAL SURVEY SHEET

0 1 2 3 4 5
Scale 1 inch = 1 mile
Contour interval 50 feet

A. Hoen & Co. Lith. Baltimore, Md.

Field Operations
Bureau of Soils
1902

U.S. DEPT OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF

SOIL MAP
NORTH CAROLINA
TAYLORSVILLE SHEET

N.C. DEPT OF AGRICULTURE
S.L. PATTERSON, COMMISSIONER
B.W. KILGORE, STATE CHEMIST

81°30′ 20′ 10′ 81°

50′

35°30′

SOIL PROFILE
(3 feet deep)

- Cecil sandy loam — Ssc / C
- Cecil clay — Scc / C
- Durham sandy loam — Ssc / Scc
- Porters sand — Ssc / Ssc
- Porters sandy loam — Ssc / C
- Porters black loam — Sc / C
- Porters clay — C / C
- Porters stony loam — Ssc / Sc
- Conowingo clay — Sc or Ssc / Scc
- Meadow

LEGEND

Ssc Sandy loam
Sc Loam
C Clay
Scc Clay loam
Sc or Ssc Gravelly loam

LEGEND

Csl Cecil sandy loam
Cc Cecil clay
Dsl Durham sandy loam
Ps Porters sand
Pl Porters sandy loam
Pbl Porters black loam
P Porters clay
Psl Porters stony loam
C Conowingo clay
M Meadow

Soils surveyed by
Thos. A. Caine
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BASE MAP ENLARGED AND REDRAWN FROM
U.S. GEOLOGICAL SURVEY SHEET

0 1 2 3 4 5
Scale 1 inch = 1 mile
Contour interval 50 feet

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